

Amendments to the Claims:

1. (Cancelled)

2. (Currently Amended) A gradient coil system according to claim [[1]] Z, wherein the one Z primary coil-like element is placed between the X primary coil-like elements and the Y primary coil-like elements in such a way that at both sides of the Z primary coil-like element there is arranged at least one X primary
5 coil-like element and at least one Y primary coil-like element such that the cooling fluid flowing through the Z-gradient coil hollow conductors indirectly cools the X and Y primary coil-like elements.

3. (Previously Presented) A gradient coil system according to claim 2, wherein the one Z primary coil-like element is placed between the two X primary coil-like elements and the two Y primary coil-like elements in such a way that at one side of the Z primary coil-like element there is arranged a first X primary
5 coil-like element and a first Y primary coil-like element, and that at the other side of the Z primary coil-like element there is arranged a second X primary coil-like element and a second Y primary coil-like element.

4. (Currently Amended) A gradient coil system according to claim [[1]] Z, wherein further including:
at least two X shield coil-like elements, at least two Y shield coil-like elements and one Z shield coil-like element, wherein the one Z shield coil-like
5 element is placed between the X shield coil-like elements and the Y shield coil-like elements.

5. (Previously Presented) A gradient coil system according to claim 4, wherein the one Z shield coil-like element is placed between the X shield coil-like elements and the Y shield coil-like elements in such a way that at both sides of the Z shield coil-like element there is arranged at least one X shield coil-like
5 element and at least one Y shield coil-like element.

6. (Cancelled)

7. (Currently Amended) A gradient coil system according to ~~claim 1~~, for magnetic resonance imaging systems, comprising at least two X primary coil-like elements, at least two Y primary coil-like elements and one Z primary coil-like element providing a modular gradient coil system, wherein the one Z primary coil-like element is made from hollow conductors, and that the one Z primary coil-like element is directly cooled by a cooling fluid flowing through said hollow conductors, and wherein the at least two X primary coil-like elements have mutually different linearity volumes by themselves or in combination with each other, the at least two Y primary coil-like elements have mutually different linearity volumes by themselves or in combination with each other, and the one Z primary coil-like element is placed between the X primary coil-like elements and the Y primary coil-like elements.

8. (Previously Presented) A gradient coil system according to claim 7, wherein the two X primary coil-like elements and the two Y primary coil-like elements positioned at both sides of the one Z primary coil-like element are indirectly cooled by said directly cooled Z primary coil-like element.

9. (Previously Presented) A gradient coil system according to claim 4, wherein the one Z shield coil-like element is made from hollow conductors, and the one Z shield coil-like element is directly cooled by a cooling fluid flowing through said hollow conductors.

10. (Previously Presented) A gradient coil system according to claim 9, wherein the two X shield coil-like elements and the two Y shield coil-like elements positioned around the one Z shield coil-like element are indirectly cooled by the directly cooled Z shield coil-like element.

11. (Currently Amended) A gradient coil system according to claim [[4]] 5, wherein the two X primary coil-like elements, the two Y primary coil-like elements and the one Z primary coil-like element provide an inner coil arrangement, that the two X shield coil-like elements, the two Y shield coil-like elements and the one Z shield coil-like element provide an outer coil arrangement, and that a layer comprising epoxy with filler material and/or a GRP tube layer are positioned between the inner coil arrangement and the outer coil arrangement.

12. (Currently Amended) A gradient coil system according to claim 11, wherein the GRP tube layer is positioned adjacent the inner coil arrangement, and that the GRP tube layer is positioned adjacent the outer coil arrangement.

13. (Currently Amended) A gradient coil system according to claim [[3]] 11, wherein the second X primary coil-like element and the second Y primary coil-like element are positioned between the one Z primary coil-like element and the epoxy or glass layer, and that the second X shield coil-like element and the second Y shield coil-like element are positioned between the one Z shield coil-like element and the GRP tube.

14. (Currently Amended) A magnetic resonance imaging system, comprising a main magnet system, a gradient coil system, a RF system and a signal processing system, wherein the gradient coil system is a gradient coil system according to claim [[1]] 7.

15. (New) A gradient coil system comprising:
a cylindrical Z primary coil-like element;
a first cylindrical X primary coil-like element and a first cylindrical Y primary coil-like element concentrically disposed radially inside and abutting the Z primary coil-like element;

a second cylindrical X primary coil-like element and a second cylindrical Y primary coil-like element concentrically disposed radially outward from and contiguous to the Z primary coil-like element;

10 a cylindrical Z shield coil-like element disposed radially outward and displaced from the second cylindrical X primary coil-like element and the second cylindrical Y primary coil-like element;

a first cylindrical X shield coil-like element and a first cylindrical Y shield coil-like element concentrically disposed radially inside and contiguous to the Z shield coil-like element and displaced from the second cylindrical X primary coil-
15 like element and the second cylindrical Y primary coil-like element;

a second cylindrical X shield coil-like element and a second Y cylindrical shield coil-like element disposed concentrically outside the Z shield coil-like element.

16. (New) The gradient coil system according to claim 15, wherein the Z primary coil-like element includes an electrically conductive tubular element through which a cooling fluid flows, the first and second cylindrical X and Y coil-like element being thermally connected to the Z primary coil-like element such
5 that the cooling fluid directly cools the Z primary coil-like element and indirectly cools the first and second X and Y primary coil-like elements; and

the Z shield coil-like element includes an electrically conductive tubular element through which a cooling fluid flows, the first and second cylindrical X and Y coil-like element being thermally connected to the Z shield coil-like element
10 such that the cooling fluid directly cools the Z shield coil-like element and indirectly cools the first and second X and Y shield coil-like elements.

17. (New) The gradient coil system according to claim 15, wherein the first and second X primary coil-like elements have mutually different linearity volumes by themselves or in combination with each other, and the first and second Y primary coil-like elements have mutually different linearity volumes by
5 themselves or in combination with each other.

18. (New) The gradient coil system according to claim 17,
wherein the first and second X primary coil-like elements have different linearity
volumes such that when the first and second X gradient coil assembly are used in
combination with a gradient current of one polarity in the second X gradient coil, a
5 first volume is defined and such that when the first and second X primary coil-like
elements are used in combination with a current of a second polarity opposite to the
first polarity flowing through the second X primary coil-like element, a second
volume is defined.

19. (New) The gradient coil system according to claim 18,
wherein the first and second Y primary coil-like elements have different linearity
volumes such that when the first and second Y gradient coil assembly are used in
combination with a gradient current of one polarity in the second Y gradient coil, a
5 first volume is defined and such that when the first and second Y primary coil-like
elements are used in combination with a current of a second polarity opposite to the
first polarity flowing through the second Y primary coil-like element, a second
volume is defined.

20. (New) A gradient coil system including a primary coil
assembly comprising:

a cylindrical Z primary coil-like element defined of electrically
conductive tubular elements configured such that current applied to the Z primary
5 coil-like element causes a gradient magnetic field along a Z direction;

a cooling fluid which flows through the hollow conductors of the Z
primary coil-like element to cool the Z primary coil-like element directly;

first and second X primary coil-like elements disposed on radially
opposite sides of the Z primary coil-like element and thermally coupled thereto to be
10 indirectly cooled by the cooling fluid flowing through the hollow conductors of the Z
primary coil-like element, the first and second X primary coil-like elements being
operative individually or in combination to define mutually different linearity
volumes; and,

first and second Y primary coil-like elements disposed on radially
15 opposite sides of the Y primary coil-like element and thermally coupled thereto to be

indirectly cooled by the cooling fluid flowing through the hollow conductors of the Z primary coil-like element, the first and second Y primary coil-like elements being operative individually or in combination to define mutually different linearity volumes.

21. (New) The gradient coil system according to claim 20, further including:

a structural support tube surrounding the primary coil assembly; and,
a cylindrical shield coil assembly surrounding and supported by the

5 support tube, the shield coil assembly including:

a Z shield coil-like element defined of electrically conductive tubular elements configured such that current applied to the Z shield coil-like element causes a gradient magnetic field along a Z direction;

10 a cooling fluid which flows through the hollow conductors of the Z shield coil-like element to cool the Z shield coil-like element directly;

first and second X shield coil-like elements radially disposed on opposite sides of the Z shield coil-like element and thermally coupled thereto to be indirectly cooled by the cooling fluid
15 flowing through the hollow conductors of the Z shield coil-like element, the first and second X shield coil-like elements being operative in combination with the first and second X primary coil-like elements; and,

20 first and second Y shield coil-like elements radially disposed on opposite sides of the Y shield coil-like element and thermally coupled thereto to be indirectly cooled by the cooling fluid flowing through the hollow conductors of the Z shield coil-like element, the first and second Y shield coil-like elements being
25 operative in combination with the first and second Y primary coil-like elements.